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EXAMINER	
WANG, QUAN ZHEN	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/022,516	Applicant(s) VOHRA, SANDEEP T.	
	Examiner Quan-Zhen Wang	Art Unit 2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 December 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-2, 4-16, 20-23, 25-32, 34-41* is/are rejected.

7)☐ Claim(s) *3,17-19,24 and 33* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1/04/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1, 4-6, 10, 14-16, 20 are rejected under 35 U.S.C. 102(e) as being unpatentable over Shigehara et al. (U.S. Patent US 6,144,784).

Regarding claims 1, 14-16, 20, Shigehara teaches an add-drop multiplexer (fig. 2), comprising: an optical transmission signal input port (fig. 2, Cin) adapted to receive a wavelength division multiplexed optical transmission signal (fig. 2, λ1-λn); an optical transmission signal output port (fig. 2, Cout) adapted to output at least a portion of the wavelength division multiplexed optical transmission signal (fig. 2, λ1-λn); an add-drop optical channel port (fig. 2, Cb) adapted to receive an optical add channel (fig. 2, λI) and output an optical drop channel (fig. 2, λi); and a wavelength selective optical filter (fig. 2, FG) arranged between the optical transmission signal input port (fig. 2, Cin), the optical transmission signal output port (fig. 2, Cout) and the optical add-drop channel port (fig. 2, Cb), wherein the wavelength selective optical filter (fig. 2, FG) reflects optical channels that will continue through the add-drop multiplexer along a transmission line to

the optical transmission signal output port (fig. 2, λ1-λi-1, λi+1-λn) and permits an optical channel (fig. 2, λi) that is to be dropped to pass through.

Regarding claims 4-5, Shigehara further teaches an optical coupler (fig. 3, 4) with the optical transmission signal input port and the wavelength selective optical filter, and the optical coupler is an optical circulator (fig. 3, 4; column 5, lines 36-37).

Regarding claim 6, Shigehara further teaches the wavelength selective optical filter comprises an optical fiber having a fiber Bragg grating (fig. 3, FG) therein, the fiber Bragg grating having a reflecting band corresponding to an optical channel permitted to pass through the add-drop multiplexer (column 5, lines 44-48).

Regarding claim 10, Shigehara further teaches that the wavelength selective filter comprises an optical fiber having a plurality of fiber Bragg gratings (fig. 18, FG1-FGn) therein arranged in series, at least one of the fiber Bragg gratings (fig. 18, FG1) having a transmission characteristic different from a transmission characteristic of a second one (fig. 18, FG3) of the fiber Bragg gratings (column 14, lines 8-11).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 2, 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shigehara et al. (U.S. Patent US 6,144,784) and in view of Takahashi et al. (U.S. Patent Application Publication US 2001/0030786 A1).

Regarding claim 2, Shigehara further teaches an add-drop multiplexer (fig. 5) further comprises a control mechanism (fig. 5, CNT) for variably controlling the characteristic of the optical filter (fig. 5, FG). Shigehara differs from the claimed invention in that Shigehara does not specifically teach that the add-drop multiplexer further comprising a wavelength tracker and stabilizer in optical communication with the wavelength selective optical filter. However, Takahashi teaches an add-drop multiplexer comprising a wavelength tracker (fig. 1, element 20, detectors 1 and 2, elements 21, 22, and 23) and stabilizer (fig. 1, element 23, 24, and 17) in optical communication with the wavelength selective optical filter (fig. 1, 15) to track and stabilize the wavelength. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply the wavelength tracker and stabilizer as it is taught by Takahashi and incorporate the tracker and stabilizer with the control mechanism in the add-drop multiplexer taught by Shigehara in order to keep wavelengths of the pass through channels not changed via variation in the ambient temperature.

Regarding claims 7-8, Takahashi further teaches a tuning element (fig. 1, 17). Takahashi further teaches the tuning element comprises a mechanical strain element attached to the optical fiber that has the fiber Bragg grating (paragraph 0024).

Regarding claim 9, Takahashi further teaches tuning element can be a thermal element in thermal contact with the fiber Bragg grating (paragraph 0042, lines 16-22).

3. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shigehara et al. (U.S. Patent US 6,144,784) and in view of Feuer et al. (U.S. Patent US 6,751,372 B2).

Regarding claim 11, Shigehara further teaches that the wavelength selective filter comprises a plurality of optical fibers, each comprising a fiber Bragg grating and the fiber Bragg gratings are arranged in parallel (fig. 19, FG11-FG1n, FG21-FG2n, FG31-FG3n). The add-drop multiplexer by Shigehara differs from the claimed invention in that Shigehara does not specifically teach that the wavelength selective filter comprises an optical multiplexer with the optical signal input port and the plurality of optical fiber Bragg gratings. However, Feuer teaches an add/drop multiplexer using an optical multiplexer (fig. 4, 302) to a plurality of filters (fig. 4, F1-F3). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply an optical multiplexer as it is taught by Feuer to replace the multiport circulator in the add-drop multiplexer taught by Shigehara, and connect the multiplexer between the input port and plurality fiber Bragg gratings, since both the combination of a multiplexer and a plurality of parallel fiber Bragg gratings and the combination of the multiport circulator and a plurality of parallel fiber Bragg gratings have the equivalent results in this particular case and the selection of any of these known equivalences would be within the level of ordinary skill in the art.

4. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shigehara et al. (U.S. Patent US 6,144,784) and in view of Cao et al. (U.S. Patent US 6,778,780 B1).

Regarding claim 12, the add-drop multiplexer by Shigehara differs from the claimed invention in that Shigehara does not specifically teach that the add-drop multiplexer further comprising an interleaver disposed between the optical transmission signal input port and the wavelength selective optical filter, the interleaver adapted to split an optical signal from the optical signal input port into a plurality of optical signals to be directed to the wavelength selective filter. However, Cao teaches an optical device (fig. 8) comprising an optical interleaver (fig. 8, 802) to splits an optical signal from the optical input port into a plurality of optical signals. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply the optical interleaver as it is taught by Cao in the add-drop multiplexer taught by Shigehara in order to couple the optical signal to the wavelength selective filters.

5. Claims 13, 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shigehara et al. (U.S. Patent US 6,144,784) and in view of Roberts et al. (U.S. Patent US 6,411,417 B1).

Regarding claims 13, 21-22, the add-drop multiplexer by Shigehara differs from the claimed invention in that Shigehara does not specifically teach that the add-drop multiplexer further comprising an optical amplifier and channel equalizer in

communication with the wavelength selective optical filter and the optical transmission signal output port. However, Roberts teaches an optical amplifier (fig. 1, 4 and 5) with adaptive equalizer (fig. 1, 7). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply the optical amplifier with adaptive equalizer taught by Roberts in the add-drop multiplexer taught by Shigehara in order to compensate attenuation caused by the optical add-drop multiplexer.

6. Claims 23, 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (U.S. Patent Application Publication US 2001/0030786 A1) and in view of Yang et al. (U.S. Patent US 6,704,509 B1).

Regarding claim 23, Takahashi teaches an add-drop multiplexer comprising an optical signal input port (fig. 1, 13a), a tunable band-reflecting optical filter (fig. 1, 15) in optical communication with the input port; a wavelength tracker (fig. 1, element 20, detectors 1 and 2, elements 21, 22, and 23) and stabilizer (fig. 1, element 23, 24, and 17) in optical communication with the wavelength selective optical filter (fig. 1, 15) to track and stabilize the wavelength. Takahashi differs from the claimed invention in that Takahashi do not specifically teach that the wavelength tracker and stabilizer comprises an optical channel monitor having an absolute wavelength reference, the optical channel monitor providing absolute wavelength and intensity information of the optical channel reflected by the wavelength selective optical filter. However, Yang teaches a compact optical channel monitor (OCM) (fig. 1) having an absolute wavelength reference (fig. 1, 34). The OCM can provide the absolute wavelength and intensity

information of the optical channels monitored (fig. 4B). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply the OCM taught by Yang in the add-drop multiplexer taught by Takahashi in order to monitor the performance of each of a plurality of channels of the signal stream propagated via an optical network.

Regarding claim 25, Takahashi further teaches the band-reflecting optical filter comprises a fiber Bragg grating (fig. 1)

Regarding claim 26, Takahashi further teaches the tuning element comprises a mechanical strain varying assembly (paragraph 0024).

Regarding claim 27, Takahashi further teaches the wavelength tracker and stabilizer comprising a temperature varying assembly (paragraph 0042, lines 16-22).

Regarding claim 28, Shigehara further teach an add channel input port (fig. 3, Cin) in communication with the reflected light from the tunable band-reflecting optical filter (fig. 3, FG).

7. Claims 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (U.S. Patent Application Publication US 2001/0030786 A1) and in view of Yang et al. (U.S. Patent US 6,704,509 B1) and further in view of Roberts et al. (U.S. Patent US 6,411,417 B1).

Regarding claims 29-30, the modified add-drop multiplexer by Takahashi, and Yang differs from the claimed invention in that Takahashi, and Yang do not specifically teach that the modified add-drop multiplexer further comprising an optical amplifier and

channel equalizer. However, Roberts teaches an optical amplifier (fig. 1, 4 and 5) with adaptive equalizer (fig. 1, 7). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply the optical amplifier with adaptive equalizer taught by Roberts in the modified add-drop multiplexer by Takahashi, and Yang in order to compensate attenuation caused by the optical add-drop multiplexer.

8. Claims 31, 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephens (U.S. Patent US 6,538,783) in view of Shigehara et al. (U.S. Patent US 6,144,784).

Regarding claim 31, Stephens teaches an optical system including add-drop devices (fig. 1b) comprising: a plurality of transmitters (fig. 1b, 14's); an add-drop multiplexer (fig. 1b, 12) in communication with the plurality of transmitters; an optical transmission line (fig. 1b, 18) in communication with the add-drop multiplexer; an optical demultiplexer (fig. 1b, 23) in communication with the optical transmission line; and a plurality of receivers (fig. 1b, 16's) in communication with the optical demultiplexer. Stephens differs from the claimed invention in that Stephens does not specifically teach the add-drop multiplexer comprises: an optical transmission signal input port adapted to receive a wavelength division multiplexed optical transmission signal; an optical transmission signal output port adapted to output at least a portion of the wavelength division multiplexed optical transmission signal; an add-drop optical channel port adapted to receive an optical add channel and output an optical drop

channel; and a wavelength selective optical filter arranged between the optical transmission signal input port, the optical transmission signal output port and the optical add-drop channel port, wherein the wavelength selective optical filter reflects optical channels that will continue through the add-drop multiplexer along a transmission line to the optical transmission signal output port and permits an optical channel that is to be dropped to pass through. However, as discussed in claim 1 above, Shigehara teaches an add-drop multiplexer comprises an optical transmission signal input port adapted to receive a wavelength division multiplexed optical transmission signal; an optical transmission signal output port adapted to output at least a portion of the wavelength division multiplexed optical transmission signal; an add-drop optical channel port adapted to receive an optical add channel and output an optical drop channel; and a wavelength selective optical filter arranged between the optical transmission signal input port, the optical transmission signal output port and the optical add-drop channel port, wherein the wavelength selective optical filter reflects optical channels that will continue through the add-drop multiplexer along a transmission line to the optical transmission signal output port and permits an optical channel that is to be dropped to pass through. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply the modified add-drop multiplexer taught by Shigehara in the system taught by Stephens in order to provide add-drop multiplexer compatible with dense WDM optical communication systems.

Regarding claim 34 Shigehara further teaches the wavelength selective optical filter comprises an optical fiber having fiber Bragg grating (fig. 3, FG), the fiber Bragg

grating have a reflecting band corresponding to an optical channel permitted to pass through the add-drop multiplexer.

9. Claims 32, 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephens (U.S. Patent US 6,538,783) in view of Shigehara et al. (U.S. Patent US 6,144,784) and in view of Takahashi et al. (U.S. Patent Application Publication US 2001/0030786 A1).

Regarding claim 32, the modified optical communication system by Stephens and Shigehara differs from the claimed invention in that Stephens and Shigehara do not specifically teach that the add-drop multiplexer in the optical communication system further comprising a wavelength tracker and stabilizer in optical communication with the wavelength selective optical filter. However, Takahashi teaches an add-drop multiplexer comprising a wavelength tracker (fig. 1, element 20, detectors 1 and 2, elements 21, 22, and 23) and stabilizer (fig. 1, element 23, 24, and 17) in optical communication with the wavelength selective optical filter to track and stabilize the wavelength. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply the wavelength tracker and stabilizer as it is taught by Takahashi in the modified optical communication system by taught Stephens and Shigehara in order to keep wavelengths of the pass through channels not changed via variation in the ambient temperature.

Regarding claim 35, the modified optical communication system by Stephens and Shigehara differs from the claimed invention in that Stephens and Shigehara do not

specifically teach that the add-drop multiplexer in the optical communication system further comprises a tuning element disposed proximate the optical fiber Bragg grating. However, Takahashi teaches an add-drop multiplexer comprising a tuning element disposed proximate the optical fiber Bragg grating (fig. 1, element 23, 24, and 17). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply the tuning element as it is taught by Takahashi in the modified optical communication system taught by Stephens and Shigehara in order to adjust the wavelengths of the pass-through and dropped channels.

Regarding claim 36, Takahashi further teaches a tuning element (fig. 1, 17). Takahashi further teaches the tuning element comprises a mechanical strain element attached to the optical fiber that has the fiber Bragg grating (paragraph 0024).

Regarding claim 37, Takahashi further teaches tuning element can be a thermal element in thermal contact with the fiber Bragg grating (paragraph 0042, lines 16-22).

Regarding claim 38, Shigehara further teaches that the wavelength selective filter comprises an optical fiber having a plurality of fiber Bragg gratings (fig. 18, FG1-FGn) therein arranged in series, at least one of the fiber Bragg gratings (fig. 18, FG1) having a transmission characteristic different from a transmission characteristic of a second one (fig. 18, FG3) of the fiber Bragg gratings.

10. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stephens (U.S. Patent US 6,538,783) in view of Shigehara et al. (U.S. Patent US 6,144,784) and further in view of Takahashi et al. (U.S. Patent Application Publication

US 2001/0030786 A1) and further in view of Feuer et al. (U.S. Patent US 6,751,372 B2).

Regarding claim 39, Shigehara further teaches that the wavelength selective filter comprises a plurality of optical fibers, each comprising a fiber Bragg grating and the fiber Bragg gratings are arranged in parallel (fig. 19, FG11-FG1n, FG21-FG2n, FG31-FG3n). The modified optical communication system by Stephens, Shigehara, and Takahashi differs from the claimed invention in that Stephens, Shigehara, and Takahashi do not specifically teach that that the wavelength selective filter comprises an optical multiplexer with the optical signal input port and the plurality of optical fiber Bragg gratings. However, Feuer teaches an add/drop multiplexer using an optical multiplexer (fig. 4, 302) to a plurality of filters (fig. 4, F1-F3). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply an optical multiplexer as it is taught by Feuer in the modified optical communication system taught by Stephens, Shigehara, and Takahashi, and connect the multiplexer between the input port and plurality fiber Bragg gratings in order to reduce the complexity of the system.

11. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stephens (U.S. Patent US 6,538,783) in view Shigehara et al. (U.S. Patent US 6,144,784) and further in view of Takahashi et al. (U.S. Patent Application Publication US 2001/0030786 A1) and further in view of Cao et al. (U.S. Patent US 6,778,780 B1).

Regarding claim 40, the modified optical communication system by Stephens, Shigehara, and Takahashi differs from the claimed invention in that Stephens, Shigehara, and Takahashi do not specifically teach that the modified add-drop multiplexer further comprising an interleaver disposed between the optical transmission signal input port and the wavelength selective optical filter, the interleaver adapted to split an optical signal from the optical signal input port into a plurality of optical signals to be directed to the wavelength selective filter. However, Cao teaches an optical device (fig. 8) comprising an optical interleaver (fig. 8, 802) to splits an optical signal from the optical input port into a plurality of optical signals. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply the optical interleave as it is taught by Cao in the modified optical communication system taught by Stephens, Shigehara, and Takahashi in order to increase the channel spacing of the optical signals before coupled into the wavelength selective filters.

12. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stephens (U.S. Patent US 6,538,783) in view of Shigehara et al. (U.S. Patent US 6,144,784) and further in view of Takahashi et al. (U.S. Patent Application Publication US 2001/0030786 A1) and further in view of Roberts et al. (U.S. Patent US 6,411,417 B1).

Regarding claim 41, the modified optical communication system by Stephens, Shigehara, and Takahashi differs from the claimed invention in that Stephens, Shigehara, and Takahashi do not specifically teach that the modified add-drop

multiplexer in the optical communication system further comprising further comprising an optical amplifier and channel equalizer in communication with the wavelength selective optical filter and the optical transmission signal output port. However, Roberts teaches an optical amplifier with adaptive equalizer (fig. 1). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to apply the optical amplifier with adaptive equalizer in the modified optical communication system by Stephens, Shigehara, and Takahashi in order to compensate attenuation caused by the optical add-drop multiplexer.

Allowable Subject Matter

13. Claims 3, 17-19, 24, 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Huber (U.S. Patent US 5,579,143) discloses an optical system with tunable in-fiber gratings.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quan-Zhen Wang whose telephone number is (571)

272-3114. The examiner can normally be reached on 8:30 AM - 5:00 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

M. R. SEDIGHIAN
PRIMARY EXAMINER

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